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Electromagnetic waves and oscillations	29	117	246	387	533	705	904	1090	1255	1494	1684	1954
Radiofrequency spectroscopy techniques	31	120	248	389	537	708	908	1092	-	1498	1687	1958
NUCLEAR AND ATOMIC PHYSICS	31	121	249	390	537	708	908	1093	1259	1499	1688	1959
Apparatus. Particle detectors	31	121	249	390	537	708	908	1093	1259	1499	1688	1959
Nuclear field theory	32	121	251	393	540	710	910	1093	1266	1503	1694	1963
Elementary particles	34	124	253	395	544	715	916	1098	1273	1510	1700	1970
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Mesons	36	126	257	399	549	723	923	1104	1283	1517	1709	1976
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Radioactivity. Nuclear decay	42	135	265	405	558	732	938	1118	1297	1532	1723	1995
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SOLID-STATE PHYSICS	51	153	279	427	588	767	966	1141	1329	1559	1759	2030
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Mechanical properties of solids	67	185	319	454	615	793	1011	1184	1371	1597	1794	2068
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GEOPHYSICS	74	199	338	474	629	819	1025	1200	1397	1617	1815	2090
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TECHNIQUE. MATERIALS	80	208	344	480	640	831	1034	1210	1420	-	-	-

ERRATA

Author Index (1950) p. 1192, column 2: Zener,C.: for "3418" read "2415".
Abstr. 1814 (1952) line 4: for "4798 (1950)" read "4798 (1949)".
Abstr. 3563 (1953) line 11: for "Rh^{156}" read "Rh^{106}".
Abstr. 7864 (1955) line 2: for "A.Luyckx" read "A.Luyckx".
Subject Index (1955) p. 1517, column 1: Entries 1395 and 2344 under the heading "Double refraction, mechanical" to be transferred to the heading "Drops".
p. 1517, column 2: Entry 6970 under the heading "Drops" to be transferred to the heading "Double refraction, mechanical".
Abstr. 42 (1956) line 3: for "March" read "May".
Abstr. 100 (1956) line 4: for "March" read "May".
Abstr. 1717 (1956) line 2: for "Y.Hirschberg" read "Y.Hirshberg".
Abstr. 2488 (1956) line 3: for "R.I.Hudson" read "R.L.Hudson".
Abstr. 5497 (1956) line 2: for "S.B.Karmohapatra" read "S.B.Karmohapatro".
Abstr. 5853 (1956) line 3: for "S.-S.Min" read "S.-S.Minn".
Abstr. 7482 (1956) line 2: for "R.F.Chaudri" read "R.M.Chaudhri".
Abstr. 7681 (1956) line 2: for "M.Govindree" read "M.Govinjee".
Abstr. 905 (1957) line 2: for "M.B.P.Vittorelli" read "M.B.Palma Vittorelli".
Abstr. 5107 (1957) line 3: for "Vol. 245" read "Vol. 243".
Abstr. 5406 (1957) line 2: for "G.J.Batty" read "C.J.Batty".
Abstr. 5651 (1957) line 3: for "P.Falk-Variant" read "P.Falk-Vairant".
Abstr. 6026 (1957) line 2: for "H.Dallmann" read "H.Kallmann".
Abstr. 6465 (1957) line 3: for "J.C.Perbay-Peyroula" read "J.C.Pebay-Peyroula".
Abstr. 7784 (1957) line 3: for "Vol. 224" read "Vol. 244".
Abstr. 671 (1958) line 2: for "J.C.Roucayol" read "J.C.Roucayrol".
Abstr. 781 (1958) line 3: for "J.C.Perbay-Peyroula" read "J.C.Pebay-Peyroula".
Abstr. 3699 (1958) line 2: for "E.R.Caianello" read "E.R.Caianiello".
Abstr. 4847 (1958) line 3: for "LINE" read "LENS".
Abstr. 6089 (1958) line 2: for "R.M.Chaudri" read "R.M.Chaudhri".
Abstr. 6811 (1958) line 4: for "Myerson,A." read "Myerson,A.L.".
Author Index (1958) p. 941, column 1: Oldroyd,J.G.: for "3557" read "3757".
p. 946, column 1: under Poincelot,P. For "224" read "244".
Subject Index (1958) p. 987, column 2: "$MnSO_4$ solutions": transfer entry "high pressure effects 8649" to "$MgSO_4$ solutions" 3 lines higher.
p. 995, column 2: "Atomic mass, $Kr^{84,86}$": insert "8374".
p. 998, column 2: "P^{32}": delete "8299", and insert "P^{32} 8299".
p. 1004, column 1: "Cobalt compounds": transfer second entry "8892" to "Cold working".

(contd on next page).

Abstr. 661 (1959) line 2: for "E.O.Hittmair" read "O.Hittmair".
Abstr. 1457 (1959) line 4: for "I.B.Karpova" read "I.V.Karpova".
Abstr. 2038 (1959) line 2: for "W.Zimmerman" read "W.Zimmermann".
Abstr. 2169 (1959) line 3: for "B.R.Ramachandra Rao" read "B.Ramachandra Rao".
Abstr. 3475 (1959) line 2: for "M.Glisksman" read "M.Glicksman".
Abstr. 3592 (1959) line 3: for "L.Levine" read "I.Levine".
Abstr. 6767 (1959) line 11: for "Seeman" read "Zeeman".
Abstr. 7682 (1959) line 12: for "hydrogeneration" read "hydrogenation".
Abstr. 9089 (1959) line 4: for "(Oct., 1958)" read "(Oct., 1956)".
Abstr. 11807 (1959) line 3: for "V.T.Telegdi" read "V.L.Telegdi".
Abstr. 11895 (1959) line 2: for "I.I.Pomeranchuk" read "I.Ya.Pomeranchuk".
Abstr. 12885 (1959) line 4: Journal reference should read "Izv. Akad. Nauk SSSR, Ser. geofiz., 1959, No. 4, 617-20".
Abstr. 13364 (1959) line 2: for "W.Schaafs" read "W.Schaaffs".
Abstr. 13383 (1959) line 12: for "11 200" read "11 112".
line 14: for "270" read "220".
line 30: delete "by".
line 31: for "5 μa" read "250 μa peak".
Abstr. 13575 (1959) line 5: for "Nacpaul" read "Nagpaul".
Abstr. 13666 (1959) line 3: for "I.Ostroumov" read "V.I.Ostroumov".
Abstr. 13776 (1959) line 3: for "Vol. 149" read "Vol. 14a".
Author Index (1959) p.1390, column 2: after Fritschen,L.J. and van Wijk,W.R., for "2891" read "12891".
p.1398, column 1: lines 35-59 (thirteen entries, Gombas,P. to Goodman,L. and Frolen,L.J.) should be inserted alphabetically in column 1, lines 60 to end, and in column 2, lines 1 to 24.
p.1462, column 2: after "Neu,H." insert "Neubauer,F.R. and Fokker,A.D. The polarisation of solar radio emission at a frequency of 200 MHz, 5308".
p.1521, column 1: for "Walker,R.E. and Westerberg,A.A." read "Walker,R.E. and Westenberg,A.A.".
Subject Index (1959) p.1572, columns 1 and 2: The entries "diamonds 11633" and "graphite 10988" under the heading "Crystal structure, atomic, inorganic compounds" to be transferred to the heading "Crystal structure, atomic, elements".
p.1580, column 2: Last entry under the heading "Deuterons, scattering" (Abstract 6278-9) to be transferred to the heading "Crystals, etching".
Abstr. 151 (1960) line 2: for "received" read "reviewed".
Abstr. 847 (1960): add Abstractor's signature "A.H.Gabriel".
Abstr. 1089 (1960) line 3: for "1870-5" read "1870-3".
Abstr. 1313 (1960) line 3: for "Landowitz" read "Landovitz".
Abstr. 1366 (1960) line 3: for "206-300" read "286-300".
Abstr. 2840 (1960) line 4: for "655-7" read "635-7".
line 6: for "Block" read "Bloch".
Abstr. 2924 (1960) line 3: "B.M.Golobin" read "B.M.Golovin".
Abstr. 3243 (1960) line 4: for "1958" read "1959".
Abstr. 3474 (1960) line 3: for "Vol. 65" read "Vol. 45".
Abstr. 3540 (1960) line 11: for "sulphide" read "sulphate".
Abstr. 4203 (1960) line 12: after "dioxide" insert comma, for "μ_{SO_2}" read "μ_{SO}", for "μ_{NH_3}" read "μ_{NH}"
line 13: for "μ_{PH_3}" read "μ_{PH}".
Abstr. 4431 (1960) line 7: for "γ-activated" read "γ-excited".
Abstr. 4432 (1960) line 3: insert page numbers "126-8".
Abstr. 4717 (1960) line 3: for "L.Lundén" read "A.Lundén".
Abstr. 5185 (1960) line 3: for "(1959)" read "(1957)".
Abstr. 5527 (1960) line 8: for "ΔG" read "ΔQ".
Abstr. 5533 (1960) line 3: for "Chou Guan-Chao" read "Chzhou Guan-Chzhao".
Abstr. 5595 (1960) line 3: for "A.M.Baldwin" read "A.M.Baldin".
Abstr. 5856 (1960) line 3: for "L.J.Cojan" read "J.L.Cojan".
Abstr. 6113 (1960) line 2: for "BULK OF GERMANIUM" read "BULK IN GERMANIUM".
Abstr. 6239 (1960) line 2: for "M.Paulis" read "M.Paulus".
Abstr. 6577 (1960) line 4: insert "In Russian" at end of journal reference.
Abstr. 6620 (1960) line 9: for "10^9 and 10^{10} deg-K" read "10^8 and 10^9 deg-K".
Abstr. 6907 (1960) line 2: for "G.Toraldi di Francia" read "G.Toraldo di Francia".
Abstr. 7008 (1960) line 3: for "Vol. 41" read "Vol. 32".
Abstr. 7146 and 7147 (1960) line 3: for "I.M.Bronstein" read "I.M.Bronshtein".
Abstr. 7288 (1960) line 3: for "Chou Guan-chao" read "Chzhou Guan-Chzhao".
Abstr. 7319 (1960) line 3: for "Chou Kuang-Chou" read "Chou Kuang-Chao".
Abstr. 7743 (1960) line 4: for "Vol. 55" read "Vol. 45"; for "No. 5" read "No. 7".
Abstr. 7851 (1960) line 13: for "cam/°K atom" read "cal/°Kg atom".
Abstr. 7852 (1960) line 16: for "cal/°kg atom" read "cal/°Kg atom".

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Abstr. 7993 (1960) line 3: insert "In Russian" at end of journal reference.
Abstr. 8033 (1960) line 5: for "Vol. 41" read "Vol. 32".
Abstr. 8264 (1960) line 6: for "absorption" read "adsorption".
Abstr. 8611 (1960) line 3: for "Ziemkiewicz" read "Zienkiewicz".
Abstr. 8733 (1960) line 4: delete "Space Research Discussion, London, 1958 (See Abstr. 8522 of 1960)".
Abstr. 8853 (1960) line 3: for "Faizulov" read "Faizullov".
Abstr. 9168 (1960) line 3: for "Yu.N.Vandakurov" read "Yu.V.Vandakurov".
Abstr. 9169 (1960) line 3: for "K.M.Stanyukovich" read "K.P.Stanyukovich".
Abstr. 9186 (1960) line 15: for "Mz" read "M_z".
Abstr. 9217 (1960): reference should read: Zh. tekh. Fiz., Vol. 29, No. 7, 815-18 (July, 1959). In Russian. English translation in: Soviet Physics—Technical Physics (New York), Vol. 4, No. 7, 736-9 (Jan., 1960).
Abstr. 9335 (1960) line 3: for "Vol. 15" read "Vol. 45".
Abstr. 9521 (1960) line 3: for "Sklyareskii" read "Sklyarevskii".
Abstr. 9634 (1960) line 3: for "B.G.Neudachin" read "V.G.Neudachin".
Abstr. 9882 (1960) line 3: for "J.F.Cotnwell" read "J.F.Cornwell".
Abstr. 10307 (1960) line 6: for "F.W.Cockow" read "F.W.Cuckow".
Abstr. 10807 (1960) last line: for "transferring" read "heat-transferring".
Abstr. 11284 (1960) line 2: for "G.Briet" read "G.Breit".
Abstr. 11457 (1960) line 3: for "I.Bondarenko" read "I.I.Bondarenko".
Abstr. 11719 (1960) line 3: for"G.E.Zilberman" read "G.E.Zil'berman".
Abstr. 11944 (1960) line 3: for "H.Watanake" read "H.Watanabe".
Abstr. 12019 (1960) line 3: for "F.Fujimato" read "F.Fujimoto".
Abstr. 12041 (1960) line 12: for "1.5°" read "1.5°K".
Abstr. 12233 (1960) line 2: for "WIENER-HOPE" read "WIENER-HOPF".
Abstr. 12931 (1960) line 3: for "M.J.Moravisik" read "M.J.Moravcsik".
Abstr. 13137 (1960) line 8: after "ground" insert "state".
Abstr. 13400 (1960): insert journal reference: Phys. Rev., Vol. 119, No. 2, 691-3 (July 16, 1960).
Abstr. 13458 (1960) line 2: for "J.Riddell, Jr" read "R.J.Riddell, Jr".
Abstr. 13490 (1960) line 14: for "M.E.Priestley" read "M.G.Priestley".
Abstr. 13536 (1960) line 5: for "A.D.Belyaeu" read "A.D.Belyaev".
Abstr. 13830 (1960) line 12: for "M.E.Priestley" read "M.G.Priestley".
Abstr. 13940 (1960) line 3: for "A.I.Roitburg" read "A.I.Roitburd".
Abstr. 14001 (1960) line 4: for "Lane" read "Laue".
Abstr. 14058 (1960) line 5: for"pressure" read "presence".
Abstr. 15121 (1960) line 3: for "Ya.S.Uflyanol" read "Ya.S Uflyand".
Abstr. 15611 (1960) line 3: for "H.Narum" read "H.Narumi";
line 4: for "(June, 1960)" read "(June, 1959)".
Abstr. 16836 (1960) line 5: for "W = MR TB$^{\alpha}$" read "W = MR/TB$^{\alpha}$".
Abstr. 17488 (1960) line 3: for "M.Hammermesh" read "M.Hamermesh".
Abstr. 18054 (1960) line 3: for "G.B.Abdullayev" read "G.B.Abdullaev".
May (1960) p. 638: Abstract serial number "5613" should read "6513".
Oct. (1960) p. 1449: for Abstract number "134654" read "14654".

English Letters	Languages	Cyrillic Letters	English Letters	Languages	Cyrillic Letters
a	R S B	А а	p	R S B	П п
b	R S B	Б б	r	R S B	Р р
ch	R S B	Ч ч	s	R S B	С с
d	R S B	Д д	sh	R S B	Ш ш
e	R S B	Е е	shch	R	Щ щ
ë	R	Ё ё	sht	B	Щ щ
é	R	Э э	t	R S B	Т т
ê	R B	Ѣ ѣ	t'	R B	Ть ть
f	R S B	Ф ф	t'	S	Ћ ћ
g	R S B	Г г	th	R	Ѳ ѳ
i	R S B	И и	ts	R S B	Ц ц
ī	R	І і	t-s	R S B	ТС тс
ĭ	R B	Й й	u	R S B	У у
j	S	Ј ј	ŭ	B	Ъ ъ
j'	S	Ђ ђ	ū	B	Ѫ ѫ
k	R S B	К к	v	R S B	В в
kh	R S B	Х х	y	S	Ј ј
l	R S B	Л л	ȳ	R	Ы ы
l'	R B	Ль ль	y̆	R	Ѵ ѵ
l'	S	Љ љ	ya	R B	Я я
m	R S B	М м	yu	R B	Ю ю
n	R S B	Н н	z	R S B	З з
n'	R B	Нь нь	zh	R S B	Ж ж
n'	S	Њ њ	‘	R	Ъ ъ
o	R S B	О о	’	R B	Ь ь

The use of l', n' and t' in Russian and Bulgarian (where they are not transliterations of a single letter, but merely l, n or t followed by the soft sign) is included to emphasize the fact that they are used for single letters only in Serbian.

Shch and sht invariably represent the letter Щ in Russian and Bulgarian respectively, since the pairs of letters (ШЧ in Russian and ШТ in Bulgarian) seem never to occur consecutively in the respective languages.

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A.E.I. Research Laboratory. Abstracts signed thus have been contributed by members of the staff of the Research Laboratory of Associated Electrical Industries, Ltd., Aldermaston, Berkshire.

The names of abstracting journals from which abstracts have been reprinted are given at the end of the "List of Journals".

Abstracts without signature have been prepared from the summary published with the article, except for a small number prepared by the editorial staff of "Science Abstracts".

LIST OF JOURNALS

The following list gives the full titles of journals referred to in "Science Abstracts", arranged in alphabetical order of the abbreviated titles used in the abstracts. Every endeavour has been made to ensure that the addresses given are those in use at the time of going to press, but as changes are continually being made no guarantee can be given of the accuracy of every entry.

The appearance of a title in this list does not necessarily imply that the journal is received regularly by "Science Abstracts". Material for abstracting comes from many sources, including borrowed copies of journals and reprints supplied by authors. Furthermore, some of the abstracts are reproduced, by permission, from other abstracting periodicals (as indicated at the foot of the abstract), and in these cases the name of the abstracting organization (from whom further information should be sought) is given in the list in place of the address of the journal, when the latter is not known. Particulars of the abstracting organizations are given at the end of this list.

It should be emphasized that an abstract is only published in "Science Abstracts" when an article or book is believed to be generally available. No abstracts are published of dissertations, reports or memoranda with limited circulation, unless copies have been deposited with several public libraries and are available from the publishers; nor of papers presented orally at meetings, unless precis of substantial length are published in the normal way. Thus the appearance of an abstract in "Science Abstracts" may generally be taken as an indication that the original is publicly available, and if it cannot be located in a library, application should be made to the publisher, at the address given in this list. In the case of books, the assistance of a bookseller should be sought. The original cannot be obtained from "Science Abstracts", though assistance will gladly be given in cases of special difficulty.

The contractions of journal titles used with the abstracts, while following the general form of those in the "World List of Scientific Periodicals" (3rd ed. London, Butterworths Scientific Publications, 1952), differ from them in some cases, to enable the title of the journal to be recognized more readily. General similarity will be found with the contractions used in "Chemical Abstracts", which have recently been adopted by the journals of the American Institute of Physics. To assist in the interpretation of contracted titles, adjectives are printed with a small initial letter, unless they form part of a proper name.

For the benefit of those who are unfamiliar with the form and purpose of such abstracting periodicals as "Science Abstracts", it may be said that each abstract is a summary of an article (or book) published elsewhere, the title of the article (or its English translation) being given at the beginning of the abstract. The "reference", printed immediately after the title and author, gives the name and date of the journal where the article was printed and the appropriate pages. In general, title, author and reference are usually required for the unambiguous identification of an article (e.g. in a bibliography), though the reference alone is sufficient for the location of the article. For books, the town of publication, the name of the publisher, and the year are given in the reference.

The form of the "reference", giving volume number, issue number, pages and date, will, it is hoped, be self-explanatory. It should be emphasized that the date given refers, in nearly every case, to the "issue" or "number" containing the article abstracted; in some cases, particularly when papers are issued separately, the "volume" when bound may bear a different date. The date given is that recorded on the issue, not the actual date of publication or receipt, unless so stated. When the volume carries no number, the year is given in its place.

If no indication of language is given in the abstract, the article may be assumed to be in English. This does not necessarily hold, however, for abstracts reproduced from other abstracting periodicals giving no indication of language.

A.C.E.C. Rev.
A.C.E.C. Revue. — Ateliers de Constructions Electriques de Charleroi, Avenue Emile Rousseau, Marcinelle-Charleroi. [French - language edition].

A.E.G. Mitt.
A.E.G. Mitteilungen. — Allgemeine Elektricitäts-Gesellschaft, Hohenzollerndamm 150, Berlin-Grunewald. [A translation of selected articles is published as: A.E.G. Progress].

A.E.G. Progress
A.E.G. Progress. — Allgemeine Elektricitäts-Gesellschaft, Hohenzollerndamm 150, Berlin-Grunewald. [English translations of selected articles from: A.E.G. Mitteilungen].

A.E.I. Engng Rev.
A.E.I. Engineering Review. (Replaces: B.T.H. Activities, Metropolitan-Vickers Gazette, Siemens Edison Swan Journal) — Associated Electrical Industries, 33 Grosvenor Place, S.W.1.

A.E.I. Res. Lab. Repr.
A.E.I. Research Laboratory Reprint (Formerly: British Thomson-Houston Research Laboratory Publication). — Associated Electrical Industries, Rugby.

A.E.I. tech. Monogr.
A.E.I. Technical Monograph (Formerly: B.T.H. Technical Monograph). — Associated Electrical Industries, Rugby.

A.S.T.M. Bull.
American Society for Testing Materials. Bulletin. — 1916 Race Street, Philadelphia, Pa.

A.T.E.J.
A.T.E. Journal. — Automatic Telephone and Electric Co., Strowger Works, Liverpool 7.

A.W.A. tech. Rev.
A.W.A. Technical Review. — Amalgamated Wireless Australasia, 554 Parramatta Road, Ashfield, New South Wales.

Abhandl. Braunschw. Wiss. Gesell.
Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft. — Publisher: Friedr. Vieweg, Brunswick.

Abhandl. Dtsch. Akad. Wiss. Berlin, Kl. Math. Phys. Tech.
Abhandlungen der Deutschen Akademie der Wissenschaften, Klasse für Mathematik, Physik und Technik. — Publisher: Akademie-Verlag, Mohrenstrasse 39, Berlin W.8.

Acad. R.P. Romine Bul. Sti. Sect. Sti. Mat. Fiz.
Academia Republicii Populare Romine Buletin Stiintific. Sectiunea de Stiinte Matematice si Fizice — Libraria Academiei R.P.R., Calea Victoriei 27, Bucarest.

Acta chem. Scand.
Acta Chemica Scandinavica. — Ejnar Munksgaard, Nörregade 6, Copenhagen.

Acta cryst.
Acta Crystallographica. — International Union of Crystallography. Publisher: Ejnar Munksgaard, Nörregade 6, Copenhagen. Subscription address: Polycrystal Book Service, G.P.O. Box 620, Brooklyn 1, N.Y.

Acta electronica
Acta Electronica. — 23 Rue du Retrait, Paris 20.

Acta metallurgica
Acta Metallurgica. — P.O. Box 1088, Schenectady, N.Y. Publisher: Pergamon Press (Acta Metallurgica), 122 East 55th Street, New York 22, N.Y.

Acta phys. Austriaca
Acta Physica Austriaca. — Springer-Verlag, Mölkerbastei 5, Vienna I.

Acta phys. Hungar.
Acta Physica Hungarica. — Magyar Tudományos Akadémia Könyvtára, Akadémia-utca 2, Budapest 5. Subscription address: "Kultura" Foreign Trade Company for Books and Newspapers, Népköztársaság utja 21, Budapest 6.

Acta phys. Polon.
Acta Physica Polonica. — Polska Akademia Nauk. Subscription address: PKWZ "Ruch", ul. Wilcza 46, Warsaw.

Acta polytech. Scand.
Acta Polytechnica Scandinavica. Subseries (Electrical Engineering Series, El; Mathematics and Computing Machinery Series, Ma; Physics including Nucleonic Series, Ph). — Scandinavian Council for Applied Research. Publication address: P.O. Box 5073, Stockholm 5.

Acta tech. (Prague)
Acta technica. — Československá Akademie Věd. Publication address: Jindřišská 14, Prague 3.

Acta tech. Hungar.
Acta Technica Academiae Scientiarum Hungaricae. — Magyar Tudományos Akadémia Könyvtára, Akadémia-utca 2, Budapest 5. Subscription address: "Kultura" Foreign Trade Company for Books and Newspapers, Népköztarsaság útja 21, Budapest 6.

Acustica
Acustica. — S. Hirzel Verlag, Stuttgart.

Advances in Phys.
Advances in Physics. (Quarterly Supplement of the Philosophical Magazine). — Taylor and Francis, Red Lion Court, Fleet Street, London, E.C.4.

Agric. horticult. engng Abstr.
Agricultural and Horticultural Engineering Abstracts. — British Society for Research in Agricultural Engineering, National Institute for Agricultural Engineering, Wrest Park, Silsoe, Beds.

Akust. Beih.
Akustische Beihefte. — Issued under the auspices of the international journal Acustica. The pagination is continuous with that of Acustica.

Akust. Zh.
Akusticheskii Zhurnal. — Akademiya Nauk SSSR, Lenin Prospekt, Moscow. [A translation is published as: Soviet Physics — Acoustics].

Allis Chalmers elect. Rev.
Allis-Chalmers Electrical Review. — Allis-Chalmers, Milwaukee 1, Wisconsin.

Alta Frequenza
Alta Frequenza. — Associazione Elettrotecnica Italiana, Via San Paolo 10, Milan.

Amer. J. Phys.
American Journal of Physics. — American Institute of Physics, 335 East 45th Street, New York 17, N.Y.

An. Acad. Brasil. Cienc.
Anais da Academia Brasileira de Ciências. — Caixa Postal 229, Rio de Janeiro.

An. Mecan. Elect.
Anales de Mecanica y Electricidad. — Reina 31, Madrid.

An. Real Soc. Espan. Fis. Quim.
Anales de la Real Sociedad Española de Física y Química. Serie A (Física). — Ciudad Universitaria, Madrid.

Analyt. Chem.
Analytical Chemistry. — American Chemical Society, 1155 Sixteenth Street N.W., Washington 6, D.C.

Ann. Acad. Sci. Fennicae
Annales Academiae Scientiarum Fennicae. Series A I (Mathematica); Series A II (Chemica); Series A III (Geologica-Geographica); Series A VI (Physica). — Snellmaninkatu 9-11, Helsinki.

Ann. Acfas
Annales de l'Acfas. — Association Canadienne-Française pour l'Avancement des Sciences, Université de Montréal, 2900 Boulevard du Mont Royal, Montreal 3.

Ann. Assoc. Internat. Calcul Analogique
Annales de l'Association internationale pour le Calcul Analogique. — Publisher: Presses Academiques Europeennes, 98 Chaussee de Charleroi, Brussels 6.

Ann. Astrophys.
Annales d'Astrophysique. — Service des Publications du C.N.R.S., 15 Quai Anatole-France, Paris 7.

Ann. Astrophys. Suppl.
Suppléments aux Annales d'Astrophysique. — Service des Publications du C.N.R.S., 15 Quai Anatole-France, Paris 7.

Ann. Fac. Sci. Univ. Toulouse
Annales de la Faculté des Sciences de l'Université de Toulouse. — Published by: Gauthier-Villars, 55 Quai des Grands Augustins, Paris 6.

Ann. Franc. Chronom.
Annales Françaises de Chronometrie. — Service des Publications du C.N.R.S., 15 Quai Anatole-France, Paris 7.

Ann. Geofis.
Annali di Geofisica. — Istituto Nazionale di Geofisica, Città Universitaria, Rome.

Ann. Geophys.
Annales de Géophysique. — Service des Publications du C.N.R.S., 15 Quai Anatole-France, Paris 7.

Ann. Inst. Fourier
Annales de l'Institut Fourier. — Place du Doyen Gosse, Grenoble (Isère).

Ann. Inst. Poincare
Annales de l'Institut Henri Poincaré. — 11 Rue Pierre-Curie, Paris 5.

Ann. Phys. (Leipzig)
Annalen der Physik. — J.A.Barth, Salomonstrasse 18 B, Leipzig, C.1.

Ann. Phys. (New York)
Annals of Physics. — Academic Press, 111 Fifth Avenue, New York 3, N.Y.

Ann. Phys. (Paris)
Annales de Physique. — Masson, 120 Boulevard Saint-Germain, Paris 6.

Ann. Radioelect.
Annales de Radioélectricité. — Compagnie Générale de T.S.F., Çentre Documentation de la CSF, 101 Boulevard Murat, Paris 16.

Ann. sci. Ecole Normale Super.
Annales Scientifiques de l'École Normale Supérieure. — Publisher: Gauthier-Villars, 55 Quai des Grands-Augustins, Paris 6.

Ann. Soc. Sci. Bruxelles
Annales de la Société Scientifique de Bruxelles. — 11 Rue des Récollets, Louvain.

Ann. Telecomm.
Annales des Télécommunications. — Centre National d'Études des Télécommunications. Subscription address: Société de la Revue d'Optique, 3 et 5, Boulevard Pasteur, Paris 15.

Ann. Univ. Turku
Annales Universitatis Turkuensis. Ser. AI (Astronomica-Chemica-Physica-Mathematica). — Turun Yliopiston Turku, Finland.

Annu. Fac. Phil. Skopje, Sect. Sci. nat.
Annuaire de la Faculté de Philosophie de l'Université de Skopje, Section des sciences naturelles. (Godišen Zbornik) — Institut de Physique de la Faculté de Sciences, Postanski fah 146, Skopje (Macedonia), Yugoslavia.

Annu. Proc. Assoc. Socs S. Africa
Annual Proceedings of the Associated Scientific and Technical Societies of South Africa. — Kelvin House, Marshall and Holland Streets, P.O. Box 5907, Johannesburg.

Annu. Rep. Sci. Works Fac. Sci. Osaka Univ.
Annual Report of Scientific Works from the Faculty of Science, Osaka University. — Osaka University, Nakanoshima, Osaka.

Appl. Math. Ser. Nat. Bur. Stand.
Applied Mathematics Series, National Bureau of Standards. — U.S. Government Printing Office, Washington 25, D.C.

Appl. sci. Res.
Applied Scientific Research. Section A (Mechanics, Heat, Chemical Engineering, Mathematical Methods); Section B (Electrophysics, Acoustics, Optics, Mathematical Methods). — Martinus Nijhoff, The Hague.

Appl. Spectrosc.
Applied Spectroscopy. — Society for Applied Spectroscopy. Publication address: P.O. Box 1228, 417 Cleveland Avenue, Plainfield, New Jersey.

Applic. and Industr.
Applications and Industry. — Part II of the Transactions of the American Institute of Electrical Engineers [Trans Amer. Inst. Elect. Engrs].

Arch. Automat. Telemekh.
Archiwum Automatyki i Telemekhaniki. — Polska Akademia Nauk, Zaklad Automatyki. Subscription address: PKWZ "Ruch", ul. Wilcza 46, Warsaw.

Arch. elekt. Übertragung
Archiv der elektrischen Übertragung. — S. Hirzel Verlag, Stuttgart.

Arch. Elektrotech. (Berlin)
Archiv für Elektrotechnik. — Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf (West Berlin); Neuenheimer Landstrasse 28-30, Heidelberg.

Arch. elektrotech. (Warsaw)
Archiwum Elektrotechniki. — Polska Akademia Nauk, Instytut Podstawowych Problemów Techniki. Subscription address: PKWZ "Ruch", ul. Wilcza 46, Warsaw.

Arch. Math. Naturvid.
Archiv for Mathematik og Naturvidenskab. — Faculty of Mathematics and Science, University of Oslo, Blindern, per Oslo.

Arch. Mech. Stos.
Archiwum Mechaniki Stosowanej. — Polska Akademia Nauk, Instytut Podstawowych Problemow Techniki, Palac Kultury i Nauki, Warsaw.

Arch. Rational Mech. Anal.
Archive for Rational Mechanics and Analysis. — Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf.

Arch. Sci. (Geneva)
Archives des Sciences. — Société de Physique et d'Histoire Naturelle de Genève. Subscription address: Librairie Payot, 40 Rue du Marché, Geneva.

Arch. tech. Messen
Archiv für technisches Messen und industrielle Messtechnik. — R.Oldenbourg, Rosenheimer Str. 145, Munich 8.

Ark. Astron.
Arkiv för Astronomi. — Kungliga Svenska Vetenskaps-akademien, Stockholm 50. Subscription address: Almqvist & Wiksell, Gamla Brogatan 26, Stockholm.

Ark. Fys.
Arkiv för Fysik. — Kungliga Svenska Vetenskapsakademien, Stockholm 50. Subscription address: Almqvist & Wiksell, Gamla Brogatan 26, Stockholm.

Ark. Geofys.
Arkiv för Geofysik. — Kungliga Svenska Vetenskaps-akademien, Stockholm 50. Subscription address: Almqvist & Wiksell, Gamla Brogatan 26, Stockholm.

Ark. Kemi
Arkiv för Kemi. — Kungliga Svenska Vetenskapsakademien, Stockholm 50. Subscription address: Almqvist & Wiksell, Gamla Brogatan 26, Stockholm.

Ark. Mat.
Arkiv. för Matematik. — Kungliga Svenska Vetenskaps-akademien, Stockholm 50. Subscription address: Almqvist & Wiksell, Gamla Brogatan 26, Stockholm.

Ark. Mineral.
Arkiv för Mineralogi och Geologi. — Kungliga Svenska Vetenskapsakademien, Stockholm 50. Subscription address: Almqvist & Wiksell, Gamla Brogatan 26, Stockholm.

Asea J.
Asea Journal. — Allmanna Svenska Elektriska AB, Västerås; Fuller Electric Ltd., Fulbourne Road, London, E.17.

Astron. J.
Astronomical Journal. — American Institute of Physics, 335 East 45th Street, New York 17, N.Y.

Astron. Zh.
Astronomicheskii Zhurnal. — "Akademkniga", ul. Kuibysheva 8, Moscow. [A translation is published as: Soviet Astronomy — AJ].

Astrophys. J.
Astrophysical Journal. — University of Chicago Press, 5750 Ellis Avenue, Chicago 37, Illinois.

Astrophys. Norveg.
Astrophysica Norvegica. — Institute of Theoretical Astrophysics, University of Oslo, Blindern, per Oslo. Subscription address: H.Aschehoug (W.Nygaard), Oslo.

Atom u. Strom
Atom und Strom. — Vereinigung Deutscher Elektrizitätswerke. Verlags- u. Wirtschaftsgesellschaft der Elektrizitätswerke, Bockenheimer Landstrasse 109, Frankfurt a. M.

Atomic Energy Res. Establ. (Harwell), Inf. Bibl.; Lecture; Mem.; Rep.; Transl.
Atomic Energy Research Establishment (Harwell), Information Bibliography; Lecture; Memorandum; Report; Translation. — H.M.Stationery Office, Kingsway, London, W.C.2.

Atomkernenergie
Atomkernenergie. — Verlag Karl Thiemig, Pilgersheimer-strasse 38, Munich 9.

Atomkraftwerk
Das Atomkraftwerk. — Supplement to: Österreichische Zeitschrift für Elektrizitätswirtschaft [Osterr. Z. ElektWirtsch.].

Atomnaya Energiya
Atomnaya Energiya. — Akademiya Nauk SSSR, Lenin Prospekt, Moscow. [English translations of relevant papers are published in Reactor Science.].

Atti Accad. Sci. Torino
Atti della Accademia delle Scienze di Torino. I. Classe di Scienze Fisiche, Matematiche e Naturali. — Via Accademia delle Scienze 6; Via Maria Vittoria 3, Turin (208).

Atti Fond. Ronchi
Atti della Fondazione Giorgio Ronchi e Contributi dell' Istituto Nazionale di Ottica. — Via S. Leonardo 79, Arcetri-Firenze, Italy.

Atti Soc. Peloritana Sci. Fis. Mat. Nat.
Atti della Società Peloritana di Scienze Fisiche Matematiche e Naturali. — Università di Messina, Messina.

Austral. J. appl. Sci.
Australian Journal of Applied Science. — Commonwealth Scientific and Industrial Research Organization, 314 Albert Street, East Melbourne, C.2, Victoria.

Austral. J. Phys.
Australian Journal of Physics. — Commonwealth Scientific and Industrial Research Organization, 314 Albert Street, East Melbourne, C.2, Victoria.

Austral. J. Sci.
Australian Journal of Science. — Australian and New Zealand Association for the Advancement of Science, Science House, 157 Gloucester Street, Sydney.

Automat. Elect. tech. J.
Automatic Electric Technical Journal (Formerly: General Telephone Technical Journal). — Automatic Electric Laboratories Inc., Northlake, Illinois.

Automat. remote Control.
Automation and Remote Control. — Instrument Society of America, 313 Sixth Avenue, Pittsburgh 22, Pennsylvania. (A translation of: Avtomatika i Telemekhanika [Avtomat. i Telemekh.]).

Automatica si Electronica
Automatica si Electronica. — Editorial address: Str. Ion Ghica 3, Bucarest. Administration address: Calea Victoriei 118, Bucarest.

Automatisme
Automatisme. — Dunod et Cie, 92 Rue Bonaparte, Paris 6.

Avhandl. Norske VidenskAkad. Oslo
Avhandlingar utgitt av Det Norske Videnskaps-Akademi i Oslo. I. Matematisk-Naturvidenskaplige Klasse. — Faculty of Mathematics and Science, University of Oslo, Blindern, per Oslo.

Avtomat. i Telemekh.
Avtomatika i Telemekhanika. — Akademiya Nauk SSSR, Lenin Prospekt, Moscow. [A translation is published as: Automation and Remote Control (Automat. remote Control)].

B.B.C. Engng Monogr.
B.B.C. Engineering Division Monographs. — British Broadcasting Corporation Publications, 35 Marylebone High Street, London, W.1.

B.B.C. Nachr.
B.B.C. Nachrichten. — Brown, Boveri und Cie, Mannheim.

B.T.-H. Activ.
B.T.H. Activities. — Replaced by: A.E.I. Engineering Review [A.E.I. Engng Rev.].

B.T.-H. Res. Lab. Publ.
British Thomson-Houston Research Laboratory Publication. — Title changed to: A.E.I. Research Laboratory Reprint [A.E.I. Res. Lab. Repr.].

B.T.-H. tech. Monogr.
British Thomson-Houston Technical Monograph. — Title changed to: A.E.I. Technical Monograph [A.E.I. tech. Monogr.].

Beama J.
Beama Journal. — British Electrical and Allied Manufacturers' Association, 36 Kingsway, London, W.C.2.

Bell Lab. Record
Bell Laboratories Record. — Bell Telephone Laboratories, 463 West Street, New York 14, N.Y.

Bell Syst. tech. J.
Bell System Technical Journal. — American Telephone and Telegraph Co., 195 Broadway, New York 7, N.Y.

Bol. Fac. Ingen. Montevideo
Boletin de la Facultad de Ingenieria y Agrimensura de Montevideo. — Herrera y Reissig 565, Montevideo.

Brennstoff-Wärme-Kraft (B.W.K.)
BWK. Brennstoff-Wärme-Kraft. — VDI-Verlag, Düsseldorf. Publisher: Springer-Verlag, Berlin-Göttingen-Heidelberg.

Brit. Commun. and Electronics
British Communications and Electronics. — Heywood and Co., Drury House, Russell Street, Drury Lane, London, W.C.2.

Brit. J. appl. Phys.
British Journal of Applied Physics. — The Institute of Physics and the Physical Society, 47 Belgrave Square, London, S.W.1.

Brit. J. Radiol.
British Journal of Radiology. — British Institute of Radiology, 32 Welbeck Street, London, W.1.

Brit. Kinematogr.
British Kinematography. — British Kinematograph Society, 164 Shaftesbury Avenue, London, W.C.2.

Brit. Pwr Engng
British Power Engineering. — George Newnes, Tower House, Southampton Street, London, W.C.2.

Brit. Stand.
British Standards. — British Standards Institution, 2, Park Street, London, W.1.

Brit. Weld. J.
British Welding Journal. — Institute of Welding, 54 Princes Gate, London, S.W.7; British Welding Research Association, 19, Fitzroy Square, London, W.1.

Brown Boveri Rev.
Brown Boveri Review. — Brown, Boveri & Company, Baden, Switzerland; 75 Victoria Street, London, S.W.1.

Bul. Inst. Politeh. Iasi
Buletinul Institutului Politehnic din Iasi (Serie Nouă). — Polytechnic Institute, Jassy.

Bull. Acad. Polon. Sci. Ser. Sci. math. astron. phys.
Bulletin de l'Académie Polonaise des Sciences. Série des Sciences Mathematiques, Astronomiques et Physiques. — Polish Academy of Sciences, Distribution Centre for Scientific Publications, Pałac Kultury i Nauki, Warsaw.

Bull. Acad. Polon. Sci. Ser. Sci. tech.
Bulletin de l'Académie Polonaise des Sciences. Série des Sciences Techniques. — Polish Academy of Sciences, Distribution Centre for Scientific Publications, Pałac Kultury i Nauki, Warsaw.

Bull. Acad. Roy. Belgique Cl. Sci.
Bulletin de la Classe des Sciences de l'Académie Royale de Belgique. — Palais des Académies, rue Ducale 1, Brussels.

Bull. Amer. Meteorol. Soc.
Bulletin of the American Meteorological Society. — 45 Beacon Street, Boston 8, Massachusetts.

Bull. Amer. Phys. Soc.
Bulletin of the American Physical Society. — Columbia University, New York 27, N.Y.

Bull. Assoc. Suisse Elect.
Bulletin de l'Association Suisse des Électriciens. (Organe Commun de l'Association Suisse des Électriciens [ASE] et de l'Union des Centrales Suisses d'Electricité [UCS]). — Seefeldstrasse 301, Zürich 8.

Bull. astron. (Paris)
Bulletin Astronomique. — L'Observatoire de Paris, 61 Avenue de l'Observatoire, Paris 14. Publisher: Gauthier-Villars, 55 Quai des Grands-Augustins, Paris 6.

Bull. Calcutta Math. Soc.
Bulletin of the Calcutta Mathematical Society. — 92 Upper Circular Road, Calcutta 9.

Bull. elect. Engng Educ.
Bulletin of Electrical Engineering Education. — Manchester College of Science and Technology, Manchester 1.

Bull. Electrotech. Lab. (Tokyo)
Bulletin of the Electrotechnical Laboratory. — 2-chome, Nagata-cho, Chiyoda-ku, Tokyo.

Bull. Fac. Engng Yokohama Nat. Univ.
Bulletin of the Faculty of Engineering of Yokohama National University. — Ohka-Machi, Minami-Ku, Yokohama.

Bull. Inst. Internat. Froid.
Bulletin de l'Institut International du Froid (French/English Edition). — 177 Boulevard Malesherbes, Paris 17.

Bull. Inst. Metals.
Bulletin of the Institute of Metals. — Issued as insert in the Journal of the Institute of Metals [J. Inst. Metals].

Bull. Inst. Nuclear Sci. "Boris Kidrich"
Bulletin of the Institute of Nuclear Sciences "Boris Kidrich". — P.O. Box 522, Belgrade.

Bull. Internat. Rly Congr. Assoc.
Monthly Bulletin of the International Railway Congress Association [English edition]. — 19 rue du Beau-Site, Brussels.

Bull. J.S.M.E.
Bulletin of the Japan Society of Mechanical Engineers. — Section 561, Marunouchi, 2-chome Marunouchi, Chiyoda-ku, Tokyo.

Bull. Kyushu Inst. Technol.
Bulletin of the Kyushu Institute of Technology (Mathematics, Natural Science). — Tobata, Japan.

Bull. Nat. Inst. Sci. India
Bulletin of the National Institute of Sciences of India. — Mathura Road, New Delhi.

Bull. Oerlikon
Bulletin Oerlikon. — Oerlikon Engineering Company, Zürich 50; Oerlikon Ltd., Victoria House, Southampton Row, London, W.C.1.

Bull. Res. Coun. Israel
Bulletin of the Research Council of Israel. Section A (Chemistry); Section C (Technology); Section F (Mathematics and Physics). — Publisher: The Weizmann Science Press of Israel, P.O.B. 801, Jerusalem.

Bull. Sci. Assoc. Ingen. Montefiore [A.I.M.]
Bulletin Scientifique de l'Association des Ingénieurs Électriciens sortis de l'Institut Électrotechnique Montefiore. — 31 Rue Saint Gilles, Liège.

Bull. sci. Cons. Acad. Yougoslavie
Bulletin Scientifique Conseil des Académies de la R.P.F. Yougoslavie. — A.Kovačiča 1, Zagreb 1.

Bull. Soc. Belge Elect.
Bulletin de la Societe Belge des Electriciens. — Title changed to: Bulletin de la Societe Royale Belge des Electriciens [Bull. Soc. Roy. Belge Elect.].

Bull. Soc. Roy. Belge Elect.
Bulletin de la Societe Royale Belge des Electriciens. — 1 Place du Trone, Brussels.

Bull. Soc. Chim. France
Bulletin de la Societe Chimique de France. — Publisher: Masson et Cie, 120 Boulevard Saint-Germain, Paris 6.

Bull. Soc. Franc. Elect.
Bulletin de la Société Française des Électriciens. — 8-14 Avenue Pierre-Larousse, Malakoff (Seine).

Bull. Soc. Franc. Mineral. Crist.
Bulletin de la Société Française de Minéralogie et de Cristallographie. — Publisher: Masson et Cie, 120 Boulevard Saint-Germain, Paris 6.

Bull. Soc. Math. France
Bulletin de la Société Mathématique de France. — 11 rue Pierre Curie, Paris 5.

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SUBJECT INDEX

INTRODUCTION.

The entries in this index refer to the abstracts by their serial number, not by the page number. The entries are grouped under headings (underlined, e.g. "Abrasion") which represent, in the main, general categories or concepts rather than specific names. If a heading for a particular subject does not appear, a more general heading should be consulted; for example, "Zone plates" would be listed under "Diffraction"; "Barkhausen discontinuities" under "Magnetization process". There are numerous cross-references directing attention to related headings in other parts of the index.

Many of the headings are subdivided by the use of subheadings, which are indented (i.e. printed slightly to the right) and commence with a small letter (for example, see the subheadings under "Absorption").

ARRANGEMENT OF HEADINGS AND SUBHEADINGS.

The headings are arranged throughout the index in alphabetical order according to British Standard 1749:1951 (the "word by word" system, not "reading right through"). The subheadings, with a few exceptions, are themselves arranged in alphabetical order under their respective headings. The exceptions (for example, see the subheadings under "Spectra", "Crystal structure, atomic") are cases where a more logical order is preferable to a purely alphabetical one.

ARRANGEMENT OF ENTRIES UNDER HEADINGS.

Entries are arranged in three alphabetical groups as follows. First group: generalities; second group: named substances (in words); third group: named substances (chemical formulae). If a search is being made for a particular substance, both the second and third alphabetical groups should be inspected since, for example, alumina may also be listed as Al_2O_3.

COLLECTED LIST OF SUBJECT HEADINGS.

The alphabetical arrangement of the headings is the most convenient for locating a known heading quickly, but there may be other related headings elsewhere in the index of which the reader is unaware, and which he would only come across by accident. To assist the reader to discover all the headings appropriate to his subject, a collected list of the headings is given at the end of the index, which should be consulted as a matter of routine each time a search is made. In this list, the headings are not arranged in alphabetical order, but are grouped into sections by subject on the same basis as the arrangement of the abstracts in the monthly issues of Physics Abstracts. By using this list, the reader can quickly determine which are the headings appropriate to his subject, and they are then easily found in the main index in their alphabetical position.

HEADINGS WITH NO ENTRIES.

Because physics is a developing subject, it is not possible to maintain the list of headings unchanged from year to year; it is subject to a continuous process of revision, with the introduction of new headings and subheadings, and the alteration and elimination of old ones. This process is a gradual one, however, and the great majority of the headings are the same as those of the previous year. To assist in maintaining the continuity of the index, all the headings in current use are printed each year, even those for which there are no abstracts to be recorded in the present volume. The latter are followed by the announcement "No entries this year"; this supplies confirmation that these headings have not been dropped from the index, and entries may reappear under them next year.

ELEMENTS, COMPOUNDS AND OTHER SUBSTANCES.

The names of elements, their compounds, a few compounds of special interest (e.g. "Water") and a few common materials (e.g. "Wood", "Paper") are included as headings. Under these, as well as under the appropriate "subject" headings, are listed any abstracts which contain significant physical information about the element, compound or substance named; except, however, that abstracts listed under the following headings are not necessarily also listed under the substance name:

Atoms	Spectra
Molecules	Luminescence spectra
Crystal structure, atomic	Raman spectra

All headings referring to nuclear properties; including Radioactivity

(The entries under these headings are themselves arranged in alphabetical order of substance or nuclide names, so that a given substance can be readily located).

Inorganic compounds of the elements are listed under the first element in the chemical formula, and all the compounds of a given element are grouped under a single heading (e.g. "Sodium compounds"). All alloys are grouped under the single heading "Alloys" in alphabetical order of the first constituent. All organic compounds are grouped under the single heading "Organic compounds", except polymers which are grouped under "Polymers", and those under special substance headings such as "Paper"; all the latter are listed in the collected list of headings at the end of the index.

BEFORE USING INDEX, CONSULT LIST OF SUBJECT HEADINGS PRINTED AT THE END

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Night sky (See Airglow).

Nightglow (See Airglow).

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Vibrating bodies
Membranes
Oscillations
Liquid oscillations
Damping
Relaxation

Elastic waves
Liquid waves
  surface
Seismic waves
Shock waves
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Acoustics
  musical
Acoustic waves
Ultrasonics
Acoustic wave propagation
  ultrasonic
Acoustic impedance
Schlieren systems
Acoustic streaming
Radiation pressure
Liquid helium
  sound propagation
Doppler effect
  acoustics

Reflection
  acoustic waves
Refraction
  acoustic waves
Dispersion, acoustic
  ultrasonic
Scattering
  acoustic waves
Interference
  acoustic waves
Interferometry
  acoustic waves
Interferometers
  acoustic waves
Diffraction
  acoustic waves
Absorption
  acoustic waves
Transmission
  acoustic waves

Velocity
  acoustic waves

Acoustic receivers
Acoustic generators
Acoustic radiators
Acoustic transducers
Microphones
Hearing aids
Acoustic analysis
Resonators
  acoustic
Bells
Musical instruments
Sound recording
Sound reproduction
Speech
Hearing
Ear
Atmospheric acoustics
Sound ranging

Physical effect of radiations
Biological effects of radiations
Chemical effect of radiations
  acoustic waves

Acoustic measurement
Acoustical laboratories
Intensity measurement
  acoustics
Stroboscopes

Velocity measurement
  acoustic waves

Sound recording
Sound reproduction
Acoustic receivers
Acoustic generators
Acoustic radiators
Acoustic transducers
Microphones
Hearing aids
Acoustic analysis
Resonators
  acoustic
Bells

Architectural acoustics
Reverberation
Echo
Noise
  acoustic
Noise abatement

OPTICS . PHOTOMETRY

Optics
Atmospheric optics
Light
  e.m. theory
  quantum theory
Photons
Cherenkov radiation
Light sources
Velocity
  light
Velocity measurement
  light
Doppler effect
  light

Photoelectricity
Radiation
Radiation pressure
Photophoresis
Radiation detectors
Bolometers
Pyrometers
Emissivity
Photometry
  light sources
Photometers
Illumination
Brightness
Densitometry

GEOMETRICAL AND INSTRUMENTAL OPTICS SPECTROSCOPY

Optics
  geometrical
Reflection
  light
Mirrors
Optical images
Aberrations, optical
Resolving power, optics

Lenses
  aspherical
  photographic
Prisms, optical
Refraction
  light
Refractive index
  light
Refractive index measurement
Refractometers
Dispersion, optical
Optical constants
Optical systems
Optical materials
Optical instrument testing
Schlieren systems

Optical pumping

Spectroscopy
  light sources
Monochromators
Spectrometers
  accessories
Spectrometers, microwave
Spectrophotometry
Spectrophotometers
Spectra
  continuous
  flames
  resonance
  atoms
  inorganic molecules
    diatomic
    diatomic, radiofrequency
    polyatomic
    polyatomic, radiofrequency
  inorganic liquids and
  inorganic solids [solutions
    radiofrequency
  organic molecules and
    infrared [substances
    radiofrequency

Raman spectra
  inorganic
  organic
Stark effect
Zeeman effect
Spectral line breadth
Electro-optical effects
Spectrochemical analysis
Temperature measurement
  spectral methods
Astronomical spectra
Atmospheric spectra
Atmospheric optics

Absorption
  light
Transmission
  light
Transparency
Pleochroism
Filters, optical
Luminescence
  gases
  inorganic
  organic
Electroluminescence
Luminescent devices

Vision
Eye
Stereoscopy
Visibility
Optical instruments
Optical instrument testing
Optical materials
Optical films
Glass
Quartz
Telescopes
Microscopes
Microscopy
Mirrors
Lenses
Light sources
Stroboscopes
Projectors, optical

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Interference
  light
Interferometry
  light
Interferometers
  light
Diffraction
  light
Diffraction gratings
Scattering
  light
Diffusion, light
Polarized light
Double refraction
  flow
  mechanical

Optical rotation
Magneto-optical effects
Electro-optical effects
Polarimeters
Photoelasticity
Absorption
  light
Transmission
  light
Transparency
Pleochroism
Filters, optical
Optical films
Reflectivity
Optical pumping

COLORIMETRY . PHOTOGRAPHY

Colour
Colorimetry
Colorimeters
Colour centres
Colour vision

Photography
  applications
  colour
  high-speed
  infrared
Lenses
  photographic
Cameras
Photographic light sources
Photographic materials
  sensitivity
Nuclear track emulsions
Photographic process
  development
Densitometry
Radiography
Cinematography
  high-speed

HEAT . RADIATION

Heat
Earth
  heat
Thermal measurement
Heat conduction
Conductivity, thermal
  gases
  liquids
  solids
  measurement
Heat transfer
Temperature distribution

Radiation
  heat
Emissivity
Convection
Heating
Cooling
Diffusion, gases
  thermal
Diffusion, liquids
  thermal
Thermal expansion
Heat treatment
Flames
Combustion
Heat of combustion

Heat of wetting

Temperature
Temperature measurement
  spectral methods
Radiation detectors
Pyrometers
Bolometers
Thermometers
  resistance
Thermostats
Thermocouples
Calorimeters
Calorimetry
Heat capacity
Specific heat
Heat of dissociation
Latent heat
Heat of vaporization
Vapour pressure
Vapour pressure measurement
Humidity
Sublimation
Heat of sublimation
Condensation
Critical constants, thermal

Thermal transformations
Phase transformations
Heat of transformation
Freezing
Supercooling
Melting
Melting point
Heat of fusion
Boiling
Boiling point
Vaporization
Evaporation
Drying
Distillation

THERMODYNAMICS

Thermodynamics
  applications
Thermodynamic properties
Entropy
  properties of substances
Equations of state
  gases
  liquids
Joule–Thomson effect

LOW-TEMPERATURE PHYSICS

Low-temperature phenomena
Quantum theory
  many-particle systems
Low-temperature production
Low-temperature technique
Liquefaction, gases
Joule–Thomson effect
Superfluidity
Liquid helium
  sound propagation

Superconductivity

ELECTRICITY
ELECTRICAL MEASUREMENTS

Electricity
Terrestrial electricity
Atmospheric electricity
Electrical measurement
Units, electrical
Electrons
Electron theory
Fluctuations
  electrical
Electro-optical effects
Counting circuits

ELECTROSTATICS . DIELECTRICS

Electrostatics
Electric fields
  effects
Electric charge
Space charge
Contact potential

Breakdown, electric
  gases
  liquids
  solids
Hysteresis
Relaxation
Electric strength
Dielectric phenomena
Dielectric measurement
Dielectric properties of
  gases
  liquids and solutions
  solids
Ferroelectric materials
Ferroelectric phenomena
Electrets
Piezoelectricity
Piezoelectric oscillations
Electrostriction
Electroluminescence
Pyroelectricity

CURRENT ELECTRICITY
ELECTROKINETICS

Conduction, electrical
Electron gas
Conductivity, electrical
  electrolytic
Resistance, electrical
Contact resistance
Contact potential
Current, electrical
Fluctuations
  electrical
Skin effect
Eddy currents
Filters, electrical
Semiconductors
Semiconducting materials
  germanium
  indium antimonide
  silicon
Semiconducting devices
  diodes and junctions
  transistors
Rectifiers
Acoustoelectric effects
Magnetoelectric effects
Hall effect
Magnetoresistance
Photoelectricity
Photoconductivity
Photovoltaic effects

Thermoelectricity
Thermocouples
Superconductivity
Electrokinetic effects
Electrophoresis
Zeta-potential

IONIZATION

Ions
  recombination
Ionization
  gases
  liquids
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Ionization, surface
Ionization potential
Dissociation
  electrolytic
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Space charge
Plasma
Plasma oscillations
Shock waves
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ELECTRIC DISCHARGES

Discharges, electric
  high-frequency
Breakdown, electric
  gases
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Gas discharge tubes
Arcs, electric
Sparks, electric
Sputtering
Lightning
Corona, electric discharge
Plasma
Plasma oscillations

PLASMA

Space charge
Plasma
Magnetohydrodynamics
Electron gas
Discharges, electric
Ionization
  gases
Thermonuclear reactions
Nuclear fusion
Nuclear reactors
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Shock waves
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ELECTRON EMISSION
ELECTRON BEAMS

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  ionization
  radiation
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Electron beams
  effects
Electron diffraction
Electron gas
Space charge
Plasma
Plasma oscillations
Fluctuations, electrical
Electron tubes
Particle optics
Electron optics
Electron lenses
  electrostatic
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Electron microscopy
Electron microscopes
Electron emission
  secondary
Thermionic emission
  electrons
Cathodes
  oxide
Work function

ION EMISSION . ION BEAMS

Ions
  recombination
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Ion beams
Particle optics
Ion optics
Ion microscopes
Ion sources
Ion emission

Thermionic emission
  ions
Gas-discharge tubes
Sputtering
Mass spectrometers
  accessories
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Ion velocity
Velocity analysis, particles
Range of particles
Bremsstrahlung
Physical effects of radiations
Biological effect of radiations
Chemical effect of radiations
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PARTICLE ACCELERATORS

Particle accelerators
  linear
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MAGNETISM

Magnetism
Magnetic measurement
Magnetic fields
  effects
Magnetic field measurement
Magnets
Terrestrial magnetism
  variations
Compasses

Ferromagnetism
Magnetization state
Magnetization process
Ferromagnetic relaxation
Antiferromagnetism
Ferrimagnetism
Antiferrimagnetism
Paramagnetism
Diamagnetism
Gyromagnetic ratio

Magnetic properties of
  ferromagnetic [substances
  antiferromagnetic
  paramagnetic
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Magnetoelectric effects
Magnetoresistance
Hall effect
Magnetomechanical effects
Gyromagnetic effect
Magnetostriction
Magneto-optical effects
Magnetothermal effects
Magnetoacoustic effects
Zeeman effect

ELECTROMAGNETISM
MAGNETOHYDRODYNAMICS

Electromagnetism
Electrodynamics
Quantum electrodynamics
Electromotive force
Inductance
Eddy currents
Magnetohydrodynamics
Plasma
Plasma oscillations
Shock waves
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Optical pumping
Magnetohydrodynamics
Plasma oscillations

Light
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Spectra
Spectrometers, microwave
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Interferometry
  electromagnetic waves

Cosmic radiations, r.f.
Sun
  radiation, r.f.
Radioastronomy
Radiation
Electromagnetic waves
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Electromagnetic waves propa-
  atmosphere [gation
  ionosphere
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Doppler effect

Diffraction
  electromagnetic waves
Reflection
  electromagnetic waves
Refraction
  electromagnetic waves
Scattering
  electromagnetic waves
Absorption
  electromagnetic waves
Electromagnetic oscillations

Radiofrequency Spectroscopy Techniques

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Interferometry
  electromagnetic waves
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Ferromagnetic resonance
Ferromagnetic relaxation
Antiferromagnetic resonance
Ferrimagnetic resonance
Antiferrimagnetic resonance
Cyclotron resonance
Paramagnetic resonance and
  [relaxation
Nuclear magnetic resonance and
  [relaxation
Nuclear quadrupole resonance

NUCLEAR AND ATOMIC PHYSICS

Nuclear physics
Physics fundamentals
Physical effects of radiations
Biological effects of radiations
Chemical effects of radiations
  ionizing radiations

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Particle detectors
Counters
  Cherenkov
  crystal
  Geiger
  proportional
  scintillation
  spark
  operation technique
Counters, accessories
Counting circuits
Statistical analysis
  applications, counters
Velocity analysis, particles
Dosimetry
Photomultipliers
Particle optics
Particle accelerators
  linear
  orbital
Radioactivity measurement
  apparatus
Alpha-ray spectrometers
Beta-ray spectrometers
Gamma-ray spectrometers
Neutron spectrometers
Mass spectrometers
  accessories
  applications

Particle tracks
Particle track visualization
Nuclear track emulsions
Cloud chambers
Bubble chambers
Ionization chambers

NUCLEAR FIELD THEORY

Field theory, classical
Field theory, quantum
  dispersion relations
  interactions
    strong
    weak
  meson field
  quantization
Quantum theory
  application methods
  quantization
  wave equations
  many particle systems
Quantum electrodynamics
Fundamental particles
Parity
Leptons
Baryons
Collision processes
Scattering
Scattering, particles
Nuclear forces

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Collision processes
Scattering, particles
Range of particles
Velocity analysis, particles
Particle tracks
Particle track visualization
Fundamental particles
Parity
Field theory, quantum
  meson field
Leptons
Baryons

Photons
Bremsstrahlung
Cherenkov radiation
Compton effect
Gamma-rays
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  angular distribution
  detection, measurement
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Gamma-ray spectra
Gamma-ray spectrometers

X-rays
  effects
X-ray measurement
X-ray absorption
X-ray diffraction
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Neutrinos and antineutrinos

Electrons
  absorption
  ionization
  radiation
  scattering
Electron theory
Positrons
Electron pairs
Positronium
Electron annihilation
Beta-rays
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  scattering
Beta-ray spectra
Beta-ray spectrometers

Nucleons and antinucleons
Protons and antiprotons
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  detection, measurement
  effects
  interactions
  magnetic moment
  polarization
  production
  scattering
  scattering, proton-deuteron
  scattering, proton-proton
  antiprotons
Neutrons and antineutrons
  absorption
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  detection, measurement
  diffusion
  effects
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  scattering, proton-neutron
Neutron diffraction
Neutron spectra
Neutron spectrometers

Mesons
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  capture
  decay
  decay observations
  detection, measurement
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  magnetic moment
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  spin and parity
Atoms, mesic

Hyperons
  absorption
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  decay observations
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Hyperfragments
Strange particles

Deuterons
  scattering
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Tritons

Alpha-particles
Alpha-rays
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  detection, measurement
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Alpha-ray spectra
Alpha-ray spectrometers

COSMIC RAYS

Cosmic rays
  absorption
  apparatus
  composition
  alpha-particles
  deuterons
  electrons
  mesons
Cosmic rays
  neutrons
  photons
  protons
  effects and interactions
  origin
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NUCLEUS

Nuclear physics
Nucleus
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  energy levels
  magnetic moment
  spin
  theory
Hyperfragments
Nuclear excitation
Nuclear decay theory
Beta decay theory
Nuclear magnetic resonance and relaxation
Gyromagnetic ratio
Nuclear forces
Nuclear isomerism

Nucleus
  energy levels
Nuclear excitation
Gamma-ray spectra

RADIOACTIVITY . NUCLEAR DECAY

Radioactivity
  artificial production
  decay periods
  decay schemes
  electron capture
Nuclear decay theory
Beta decay theory
Radioactivity measurement
  apparatus
Radioactive dating
Radioactive tracers
Radiation protection
Radiation monitoring
Biological effects of radiations
Dosimetry
Chemical effects of radiations
  ionizing radiations
Radiochemistry
Physical effects of radiations

Atmosphere
  radioactivity
Fallout
Alpha-rays
  absorption
  angular distribution
  detection, measurement
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  scattering
Alpha-ray spectra
Alpha-ray spectrometers
Alpha-ray particles

Beta-rays
  absorption
  angular distribution
  detection, measurement
  effects
  scattering
Beta-ray spectra
Beta-ray spectrometers

Gamma-rays
  absorption
  angular distribution
  detection, measurement
  effects
  internal conversion
  scattering
Gamma-ray spectra
Gamma-ray spectrometers
Compton effect

NUCLEAR REACTIONS

Nuclear excitation
Nuclear forces
Collision processes
Nuclear reactions
  chemical effects
Nuclear reactions due to
  alpha-rays
  cosmic rays
  deuterons
  electrons
  helium - 3
  mesons
  neutrons
  nuclei of Z > 2
  photons
  protons
  tritons
Thermonuclear reactions
Nuclear fission
  products
Nuclear fusion
Nuclear spallations

Physical effects of radiations
Chemical effects of radiations
  ionizing radiations
Biological effects of radiations
Radiation monitoring
Radiation protection

NUCLEAR POWER STUDIES

Nuclear reactors
  fission
  fusion

Thermonuclear reactions
Nuclear fission
  products
Nuclear fusion
Nuclear spallation

Physical effects of radiations
Chemical effects of radiations
  ionizing radiations

Biological effects of radiations
Radiation monitoring
Radiation protection

Dosimetry
Radiochemistry

ATOMS

Atoms
  excitation
  magnetic moment
  structure
Atoms, mesic
Constants
  fundamental
Gyromagnetic ratio
Ionization potential
Atomic mass
Atomic weight
Atomic beams
Periodic system
Elements
  origin
  relative abundances
Isotopes
Mass spectrometers
  accessories
  applications
Tracers
Optical pumping
Spectra
  atoms
Isotopes
  detection
  relative abundances
Mass spectra
Isotope exchanges
Isotope separation
Mass spectrometers
  accessories
  applications
Atoms, mesic

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Molecules
  configuration and dimensions
    inorganic
    organic
    macromolecules
  dissociation
  dissociation energies
  excitation
  intermolecular mechanics
  internal mechanics
    electronic structure
    nuclear coupling
    vibration and rotation
Molecules
  moments
  relaxation
Bonds
Valency
Chemical structure
Spectra
Molecular beams
Molecular weight
Avogadro' s number
Polymers
Isomerism
Spectra
  inorganic molecules
    diatomic
    diatomic, radiofrequency
    polyatomic
    polyatomic, radiofrequency
  organic molecules and substances
    infrared
    radiofrequency

SOLID-STATE PHYSICS

Solids
  structure
  theory
Electron gas
Cyclotron resonance
Metals
  theory
Equations of state
  solid
Crystals
Crystal properties
Colour centres
Crystal structure
Crystal structure, atomic
Physical effects of radiations

Lattice Dynamics

Crystals
  lattice mechanics

Acoustic wave propagation
  ultrasonic
Scattering
  acoustic waves
Diffraction
  acoustic waves
Absorption
  acoustic waves
Transmission
  acoustic waves

Specific heat
Heat capacity
Thermal expansion
Thermal transformations
Melting
Melting point

Conductivity, thermal
  solids
Equations of state
  solid

Crystals
  electron states
Crystal structure
Crystal properties
Electron gas
Cyclotron resonance
Electron beams
  effects

Electrons
  scattering
  absorption
  radiation

Defect Properties

Crystal structure
Crystals
  imperfections
  etching
  twinning
Slip
Cold working
Heat treatment
Elastic deformation
Plastic deformation
Diffusion, solids
Colour centres
Absorption
  light
X-rays
  effects

Physical effects of radiations
Electron beams
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Ion beams
X-rays
  effects
Protons
  effects
Neutrons
  effects
Mesons
  effects
Gamma-rays
  effects

ELECTRICAL PROPERTIES OF SOLIDS

Electricity
Electrical measurement
Conduction, electrical
Electron gas
Conductivity, electrical
  electrolytic
Resistance, electrical
Contact resistance
Contact potential
Current, electrical
Fluctuations
  electrical

Skin effect
Eddy currents
Magnetoelectric effects
Hall effect
Magnetoresistance

Electro-optical effects
Acoustoelectric effects
Superconductivity
Electrokinetic effects

Semiconductors

Semiconductors
Semiconducting materials
  germanium
  indium antimonide
  silicon
Semiconducting devices
  diodes and junctions
  transistors

Rectifiers

Magnetoelectric effects
Hall effect
Magnetoresistance

Photoconductivity

Photoelectricity
Photoconductivity
Photovoltaic effects

Thermoelectric Properties

Thermoelectricity
Thermocouples
Pyroelectricity

Dielectric Properties

Electric fields
Electric charge
Space charge
Contact potential

Breakdown, electric
  solids
Hysteresis
Relaxation
Electric strength
Electrets
Rochelle salt

Dielectric phenomena
Dielectric measurement
Dielectric properties of
  solids | substances
Ferroelectric materials
Ferroelectric phenomena

Piezoelectricity
Piezoelectric oscillations
Electrostriction
Electroluminescence
Pyroelectricity

OPTICAL PROPERTIES OF SOLIDS

Optics
Velocity
  light
Refraction
  light
Refractive index
  light
Dispersion, optical
Optical constants
Optical materials
Optical films
Absorption
  light
Transmission
  light
Transparency
Pleochroism
Filters, optical
Reflection
  light
Reflectivity
Optical constants

Interference
  light
Interferometry
  light
Interferometers
  light
Diffraction
  light
Diffraction gratings
Scattering
  light
Diffusion, light
Polarized light
Double refraction
  flow
  mechanical

Optical rotation
Magneto-optical effects
Electro-optical effects
Photoelasticity

Spectra
  continuous
  flames
  resonance
  atoms
  inorganic molecules
    diatomic
    diatomic, radiofrequency
    polyatomic
    polyatomic, radiofrequency
  inorganic solids
    radiofrequency
  organic molecules and
    infrared [substances
    radiofrequency
Raman spectra
  inorganic
  organic
Stark effect
Zeeman effect
Spectral line breadth
Electro-optical effects

X-ray spectra
  absorption
  emission
Optical pumping

Luminescence
  inorganic
  organic
Electroluminescence
Luminescent devices
Colour centres

MAGNETIC PROPERTIES OF SOLIDS

Magnetism
Magnetic fields
  effects
Ferromagnetism
Magnetization state
Magnetization process
Ferromagnetic relaxation
Antiferromagnetism
Ferrimagnetism
Antiferrimagnetism
Paramagnetism
Diamagnetism
Gyromagnetic ratio
Ferrites

Magnetic properties of
  ferromagnetic [substances
  antiferromagnetic
  paramagnetic
  diamagnetic
Magnetoelectric effects
Magnetoresistance
Hall effect
Magnetomechanical effects
Gyromagnetic effect
Magnetostriction
Magneto-optical effects
Magnetothermal effects
Magnetoacoustic effects
Zeeman effect

Magnetic Resonances

Ferromagnetic resonance
Ferromagnetic relaxation
Antiferromagnetic resonance
Ferrimagnetic resonance
Antiferrimagnetic resonance
Cyclotron resonance

Paramagnetic resonance and
  [relaxation
Nuclear magnetic resonance
  [and relaxation
Masers
Optical pumping

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Elasticity
Elastic constants
Stress analysis
Photoelasticity
Stress/strain relations
Stresses, internal
Strain gauges
Elastic limit
Internal friction
Elastic deformation
Bending
Torsion

Plasticity
Plastic deformation
Plastic flow
Slip
Viscoelasticity
Compressibility
Elastic fatigue
Elastic relaxation
Hysteresis

Creep
Mechanical strength
Breaking strength
Impact
Fracture
Brittleness

Adhesion
Abrasion
Hardness
Work hardening
Heat treatment
Cold working
Stresses, internal

Rheology
Thixotropy
High-pressure phenomena and
  [effects
Friction
Lubrication

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Phase transformations
Crystal structure
Metals
  theory
Density
  solids
Solids
  structure
  theory
Crystal properties
Crystals
Crystallography
  mathematical
Crystals
  electron states
  etching
  faces
  growth
  imperfections
  lattice mechanics
  orientation
  twinning
Crystal chemistry
Crystallization
Heat of crystallization
Polymorphism

Crystal properties
Colour centres
Counters
  crystal
Crystal structure

Mineralogy

Crystal structure, atomic
  elements
  inorganic compounds
  organic compounds
X-ray crystallography
  apparatus
  calculation apparatus
  calculation methods
  technique
X-ray examination of materials
  microstructure
  molecular structure
Electron diffraction crystallo-
  [graphy
Electron diffraction examination
Electron microscope examina-
  [tion
Neutron diffraction crystallo-
  [graphy
Neutron diffraction examination

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Alloys
Metallurgy
Solid solutions
Solubility
Precipitation
Steel
Zone refining
Sputtering
Sintering
Crystal structure, atomic
  alloys
Phase transformations
Heat treatment
Cold working

Amorphous state
Vitreous state
Glass
Plastics
Polymers
Granular structure

Powders
Fibres
Membranes
Waxes
Brittleness
Particle size
Sintering
Porosity
Permeability, mechanical
Surface phenomena
Surface texture
Surface energy
Surface measurement

Films
  solid
Membranes
Filters

Permeability, mechanical
Diffusion, solids

X-ray and Electron Microscope Examination

X-ray examination of materials
  microstructure
  molecular structure
Radiography

Electron diffraction examina-
  [tion
Electron microscope examina-
  [tion
Electron microscopes
Electron microscopy
Ion microscopes
Microscopy
Neutron diffraction examination

Granular structure
Particle size
Surface texture

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Atomic weight
Molecular weight
Molecular weight determination
Avogadro' s number
Periodic system
Elements
  origin
  relative abundances
Bonds
Valency
Chemical structure

Polymers
Polymerization
Isomerism

Laboratory apparatus
Balances
Pumps
Centrifuges
Distillation
Filters
Chemical technology
Precipitation

THERMOCHEMISTRY . REACTIONS

Phase equilibrium
Crystal chemistry
Reaction kinetics
Chemical reactions
Dissociation
Oxidation
Exchanges, chemical
Isotope exchanges

Heat of adsorption
Heat of reaction
Heat of formation
Heat of dissociation
Explosions
Combustion
Heat of combustion
Catalysis

ELECTROCHEMISTRY

Electrochemistry
  electrodes
Electrolysis
Conductivity, electrical
  electrolytic
Ions, electrolytic

Ion velocity
  electrolytic
Electrophoresis
Zeta-potential
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Alkali metal compounds
Alkaline earth metals
Alkaline earth compounds
Alloys
Inert gases
Rare earth metals
Rare earth compounds

Deuterium
Tritium
Air
Ozone
Liquid helium
Ice
Steam
Water
Seawater

Alloys
Metals
Semiconductors
Semiconducting materials

Steel
Fibres
Paper
Wood
Minerals
Diamonds
Graphite
Ferrites

Glass
Glass-metal seals
Mica
Optical materials
Quartz
Rochelle salt

Bitumen
Ceramics
Coal
Concrete
Clay
Sand
Soil

Bone
Blood
Gelatin
Leather
Proteins
Rubber
Waxes
Plastics
Polymers

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PHYSICS ABSTRACTS

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AUTHOR INDEX

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All names are reproduced in the abstracts and the index with the same spelling as in the original articles; in the case of articles printed in Cyrillic characters, a letter-by-letter transliteration is given, in accordance with the scheme given at the beginning of this volume of "Science Abstracts". Russian authors' names may appear in Latin-alphabet publications in various forms, due to the use of different transliteration schemes; these names are reproduced as printed in the articles abstracted.

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$$\frac{a}{\pi}\int_{-\infty}^{\infty}\frac{e^{-y^2}dy}{a^2+(v-y)^2}$$

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ELECTRIC WAVES AND OSCILLATIONS	23	76	146	218	283	341	407	484	550	604	661	748
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Amplifiers	31	83	155	226	289	351	414	491	555	612	668	768
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ELECTRONICS	35	86	159	231	293	356	418	495	556	616	671	776
Semiconductor materials and devices. Transistors	35	86	159	231	293	356	418	495	556	616	671	776
Photoelectric devices	37	88	163	236	296	358	422	498	558	618	672	779
Particle accelerators	37	–	164	237	–	358	422	–	558	619	673	780
Electron tubes	37	88	165	237	296	358	422	499	558	619	673	781
Gas discharge. Gas-discharge tubes	38	90	166	239	298	361	427	501	560	622	676	787
Electronic equipment	38	90	167	239	298	362	428	502	560	622	677	788
Medical electronics	–	–	–	–	–	–	429	503	561	623	677	790
TELECOMMUNICATION	39	91	169	240	299	363	431	504	563	623	677	794
Telegraph and telephone systems	40	92	169	240	299	363	432	505	563	624	678	795
Telephone equipment. Communication networks and cables	41	93	171	241	300	364	433	507	564	625	679	801
Electroacoustic apparatus	41	94	173	242	300	364	434	507	565	625	679	801
Radiocommunication	43	96	176	244	301	365	435	509	566	626	680	804
Transmitters. Receivers	44	97	176	245	301	365	437	509	567	626	680	805
Radiofrequency equipment	44	–	177	245	301	366	437	–	568	627	681	807
Aerials	45	97	177	245	301	366	437	510	568	627	681	807
Propagation. Interference	45	99	179	246	305	367	439	511	570	629	684	811
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Television	49	103	184	249	308	370	443	515	575	636	687	818
CONTROL. DATA PROCESSING	52	104	187	251	309	372	446	517	578	640	689	822
Control and servo systems	52	104	187	251	309	372	446	517	578	640	689	822
Telecontrol. Telemetering	52	105	189	252	312	374	448	519	580	643	690	829
Computers. Applications	53	106	189	252	313	377	450	519	581	644	691	831
MECHANICAL AND CIVIL ENGINEERING. TECHNOLOGY	59	112	191	256	315	384	452	–	583	–	696	839
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ERRATA

Abstr. 4449 (1959) line 3: for "A.Wollener" read "A.Wollenek".
Abstr. 4570 (1959) line 11: for "transidyne" read "Transidyne" (this term is a Registered Trade Mark).
Abstr. 5054 (1959) line 10: for "normal generating" read "operating".
Abstr. 5647 (1959) line 3: for "(May-June, 1959)" read "(May-June, 1958)".
Abstr. 5652 (1959) line 3: for "Automat." read "Avtomat".
Abstr. 5797 (1959) line 5: for "13 times" read "$\sqrt{3}$ times".
Abstr. 5979 (1959) line 2: for "M.E.Pio" read "E.Pio".
Abstr. 6158 (1959) line 2: for "Kot'tsov" read "Kol'tsov".
Abstr. 6310 (1959) line 2: for "O.Bendikt" read "O.Benedikt".
Abstr. 6608 (1959) line 2: for "[Le BRUIT DE FORD]" read "[Le bruit de fond]".
Abstr. 6736 (1959) line 2: for "N.N.Fullilove" read "M.N.Fullilove".
Abstr. 6787 (1959) line 2: for "K.M.Siegal" read "K.M.Siegel".
Abstr. 6852 (1959) line 3: for "See also preceding abstract" read "See Abstr. 7668 of 1959".
Abstr. 6881 (1959) line 2: for "J.Zaborsky" read "J.Zaborszky".
Abstr. 7015 (1959) line 7: for "30 kΩ9 " read "30 kΩ".
Abstr. 7020 (1959) line 4: for "Pt 5" read "Pt 6".
Abstr. 7021 (1959) line 4: for "Pt 5" read "Pt 6".
Abstr. 7216 (1959) line 6: for "3.5 volts" read "3.8 volts".
line 8: for "Zr:UC" read "ZrC:UC".
Abstr. 7514 (1959) line 4: for "Pt 5" read "Pt 6".
Author Index (1959) p. 788, column 1: Kreuder,N.L.; add entry "Electronic design: reliability versus manufacturing cost, 7468".
p. 825, column 2: delete "Swarup,G. and Yang,K.S. Interferometer phasing at microwave frequencies, 7468".
p. 837, column 1: delete "Yang,K.S. See Swarup,G., 7468".
p. 836, column 1: for "Wollener,A." read "Wollenek,A.".
Subject Index (1959) p. 842, column 1: under Aerials, directive, delete line 31.
p. 867, column 2: under Electronic equipment, insert "economic considerations, 7468" between lines 72 and 73.

Abstr. 150 (1960) line 4: for "399-408" read "409-18".
Abstr. 269 (1960): for title as printed substitute "MONOTONIC MULTI-SECTION TAPERS FOR OVER-MODED CIRCULAR WAVEGUIDES".
Abstr. 678 (1960) line 7: after "extend" insert "their life and make".
Abstr. 1356 (1960) line 9: for "is" read "in".
Abstr. 1844 (1960) line 12: for "200 miles" read "2000 miles".
Abstr. 2375 (1960) line 3: for "Vol. 20" read "Vol. 90".
Abstr. 2691 (1960) line 3: for "N.Narbut" read "P.Narbut".
Abstr. 2714 (1960) line 3: insert "In French" at end of journal reference.
Abstr. 2840 (1960) line 3: for "(Feb., 1960)" read "(Dec., 1959)".
Abstr. 3004 (1960): for a full version of this paper see Abstr. 1785 (1960).
Abstr. 3108 (1960) line 3: for "H.Owyang" read "G.H.Owyang".
Abstr. 3202 (1960) line 2: for "G.H.Scholten" read "C.G.H.Scholten".
Abstr. 3287 (1960) line 3: for "M.S.Kohn" read "S.Kohn".
Abstr. 3297 (1960) line 4: for "Yu.Birzvalks" read "Yu.Birzvalk".
Abstr. 3301 (1960) line 4: for "M.B.Hochart" read "B.Hochart".
line 5: for "78-81" read "72-81".
Abstr. 3340 (1960) line 3: for "M.B.Fernier" read "B.Fernier".
Abstr. 3520 (1960) line 1: for "clasification" read "classification".
Abstr. 4069 (1960) line 2: for "M.J.C.Fowell" read "E.J.C.Fowell".
Abstr. 4220 (1960) line 3: for "H.Guilion" read "H.Guillon".
Abstr. 4453 (1960) line 15: for "Z.F.Zoyner" read "Z.F.Voyner".
Abstr. 4642 (1960) line 3: for "H.Fishher" read "H.Fischer".
Abstr. 4918 (1960) line 8: for "consumption is 24 hrs" read "consumption in 24 hrs".
line 10: for "5 kW/m^3" read "5 kWh/m^3".
Abstr. 5302 (1960) line 4: for "Trans" read "Proc".
Abstr. 5637 (1960) line 7: for "conductive" read "conducive".
Abstr. 5641 (1960) line 6: insert "insufficient to cause oscillation and the amount of delay" after "the degree of feed-back being".
Abstr. 5722 (1960) line 1: for "ELECTRIC" read "ELECTRONIC";
line 5: for "bands" read "boards".
Abstr. 5748 (1960) line 7: for "amplifier" read "amplifiers".
Abstr. 5909 (1960) line 1: for "DASK" read "DANSK".
Abstr. 6649 (1960) line 3: for "vables" read "cables".
Abstr. 6670 (1960) line 3: for "No. 2" read "No. 3".
Abstr. 6876 (1960) line 3: for "Vol. EM-7" read "Vol. ME-7".
Abstr. 7249 (1960) line 1: for "IF THE PROPERTIES" read "OF THE PROPERTIES".
line 7: for "intermediate frames" read "indeterminate frames".
January 1960, p. 3, column 2: between Abstr. 31 and 32, the cross-reference should read "Remote controlled operation of substations. See Abstr. 542".
July (1960) p. 417: for "4356 read "4256".

THE TRANSLITERATION OF RUSSIAN FOR BIBLIOGRAPHICAL PURPOSES

English Letters	Languages	Cyrillic Letters	English Letters	Languages	Cyrillic Letters
a	R S B	А а	p	R S B	П п
b	R S B	Б б	r	R S B	Р р
ch	R S B	Ч ч	s	R S B	С с
d	R S B	Д д	sh	R S B	Ш ш
e	R S B	Е е	shch	R	Щ щ
ë	R	Ё ё	sht	B	Щ щ
é	R	Э э	t	R S B	Т т
ê	R B	Ѣ ѣ	t'	R B	Ть ть
f	R S B	Ф ф	t'	S	Ћ ћ
g	R S B	Г г	th	R	Ѳ ѳ
i	R S B	И и	ts	R S B	Ц ц
ī	R	І і	t-s	R S B	ТС тс
ĭ	R B	Й й	u	R S B	У у
j	S	Ј ј	ŭ	B	Ъ ъ
j'	S	Ђ ђ	ū	B	Ѫ ѫ
k	R S B	К к	v	R S B	В в
kh	R S B	Х х	y	S	Ј j
l	R S B	Л л	ȳ	R	Ы ы
l'	R B	Ль ль	y̆	R	Ѵ ѵ
l'	S	Љ љ	ya	R B	Я я
m	R S B	М м	yu	R B	Ю ю
n	R S B	Н н	z	R S B	З з
n'	R B	Нь нь	zh	R S B	Ж ж
n'	S	Њ њ	‘	R	Ъ ъ
o	R S B	О о	’	R B	Ь ь

The use of l', n' and t' in Russian and Bulgarian (where they are not transliterations of a single letter, but merely l, n or t followed by the soft sign) is included to emphasize the fact that they are used for single letters only in Serbian.

Shch and sht invariably represent the letter Щ in Russian and Bulgarian respectively, since the pairs of letters (ШЧ in Russian and ШТ in Bulgarian) seem never to occur consecutively in the respective languages.

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If no indication of language is given in the abstract, the article may be assumed to be in English. This does not necessarily hold, however, for abstracts reproduced from other abstracting periodicals giving no indication of language.

A.C.E.C. Rev.
A.C.E.C. Revue. — Ateliers de Constructions Electriques de Charleroi, Avenue Emile Rousseau, Marcinelle-Charleroi. [French - language edition].

A.E.G. Mitt.
A.E.G. Mitteilungen. — Allgemeine Elektricitäts-Gesellschaft, Hohenzollerndamm 150, Berlin-Grunewald. [A translation of selected articles is published as: A.E.G. Progress].

A.E.G. Progress
A.E.G. Progress. — Allgemeine Elektricitäts-Gesellschaft, Hohenzollerndamm 150, Berlin-Grunewald. [English translations of selected articles from: A.E.G. Mitteilungen].

A.E.I. Engng Rev.
A.E.I. Engineering Review. (Replaces: B.T.H. Activities, Metropolitan-Vickers Gazette, Siemens Edison Swan Journal) — Associated Electrical Industries, 33 Grosvenor Place, S.W.1.

A.E.I. Res. Lab. Repr.
A.E.I. Research Laboratory Reprint (Formerly: British Thomson-Houston Research Laboratory Publication). — Associated Electrical Industries, Rugby.

A.E.I. tech. Monogr.
A.E.I. Technical Monograph (Formerly: B.T.H. Technical Monograph). — Associated Electrical Industries, Rugby.

A.S.T.M. Bull.
American Society for Testing Materials. Bulletin. — 1916 Race Street, Philadelphia, Pa.

A.T.E.J.
A.T.E. Journal. — Automatic Telephone and Electric Co., Strowger Works, Liverpool 7.

A.W.A. tech. Rev.
A.W.A. Technical Review. — Amalgamated Wireless Australasia, 554 Parramatta Road, Ashfield, New South Wales.

Abhandl. Braunschw. Wiss. Gesell.
Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft. — Publisher: Friedr. Vieweg, Brunswick.

Abhandl. Dtsch. Akad. Wiss. Berlin, Kl. Math. Phys. Tech.
Abhandlungen der Deutschen Akademie der Wissenschaften, Klasse für Mathematik, Physik und Technik. — Publisher: Akademie-Verlag, Mohrenstrasse 39, Berlin W.8.

Acad. R.P. Romine Bul. Sti. Sect. Sti. Mat. Fiz.
Academia Republicii Populare Romine Buletin Stiintific. Sectiunea de Stiinte Matematice si Fizice — Libraria Academiei R.P.R., Calea Victoriei 27, Bucarest.

Acta chem. Scand.
Acta Chemica Scandinavica. — Ejnar Munksgaard, Nörregade 6, Copenhagen.

Acta cryst.
Acta Crystallographica. — International Union of Crystallography. Publisher: Ejnar Munksgaard, Nörregade 6, Copenhagen. Subscription address: Polycrystal Book Service, G.P.O. Box 620, Brooklyn 1, N.Y.

Acta electronica
Acta Electronica. — 23 Rue du Retrait, Paris 20.

Acta metallurgica
Acta Metallurgica. — P.O. Box 1088, Schenectady, N.Y. Publisher: Pergamon Press (Acta Metallurgica), 122 East 55th Street, New York 22, N.Y.

Acta phys. Austriaca
Acta Physica Austriaca. — Springer-Verlag, Mölkerbastei 5, Vienna I.

Acta phys. Hungar.
Acta Physica Hungarica. — Magyar Tudományos Akadémia Könyvtára, Akadémia-utca 2, Budapest 5. Subscription address: "Kultura" Foreign Trade Company for Books and Newspapers, Népköztársaság utja 21, Budapest 6.

Acta phys. Polon.
Acta Physica Polonica. — Polska Akademia Nauk. Subscription address: PKWZ "Ruch", ul. Wilcza 46, Warsaw.

Acta polytech. Scand.
Acta Polytechnica Scandinavica. Subseries (Electrical Engineering Series, El; Mathematics and Computing Machinery Series, Ma; Physics including Nucleonic Series, Ph). — Scandinavian Council for Applied Research. Publication address: P.O. Box 5073, Stockholm 5.

Acta tech. (Prague)
Acta technica. — Československá Akademie Véd. Publication address: Jindřišská 14, Prague 3.

Acta tech. Hungar.
Acta Technica Academiae Scientiarum Hungaricae. — Magyar Tudományos Akadémia Könyvtára, Akadémia-utca 2, Budapest 5. Subscription address: "Kultura" Foreign Trade Company for Books and Newspapers, Népköztarsaság útja 21, Budapest 6.

Acustica
Acustica. — S. Hirzel Verlag, Stuttgart.

Advances in Phys.
Advances in Physics. (Quarterly Supplement of the Philosophical Magazine). — Taylor and Francis, Red Lion Court, Fleet Street, London, E.C.4.

Agric. horticult. engng Abstr.
Agricultural and Horticultural Engineering Abstracts. — British Society for Research in Agricultural Engineering, National Institute for Agricultural Engineering, Wrest Park, Silsoe, Beds.

Akust. Beih.
Akustische Beihefte. — Issued under the auspices of the international journal Acustica. The pagination is continuous with that of Acustica.

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Akusticheskii Zhurnal. — Akademiya Nauk SSSR, Lenin Prospekt, Moscow. [A translation is published as: Soviet Physics — Acoustics].

Allis Chalmers elect. Rev.
Allis-Chalmers Electrical Review. — Allis-Chalmers, Milwaukee 1, Wisconsin.

Alta Frequenza
Alta Frequenza. — Associazione Elettrotecnica Italiana, Via San Paolo 10, Milan.

Amer. J. Phys.
American Journal of Physics. — American Institute of Physics, 335 East 45th Street, New York 17, N.Y.

An. Acad. Brasil. Cienc.
Anais da Academia Brasileira de Ciências. — Caixa Postal 229, Rio de Janeiro.

An. Mecan. Elect.
Anales de Mecanica y Electricidad. — Reina 31, Madrid.

An. Real Soc. Espan. Fis. Quim.
Anales de la Real Sociedad Española de Física y Química. Serie A (Física). — Ciudad Universitaria, Madrid.

Analyt. Chem.
Analytical Chemistry. — American Chemical Society, 1155 Sixteenth Street N.W., Washington 6, D.C.

Ann. Acad. Sci. Fennicae
Annales Academiae Scientiarum Fennicae. Series A I (Mathematica); Series A II (Chemica); Series A III (Geologica-Geographica); Series A VI (Physica). — Snellmaninkatu 9-11, Helsinki.

Ann. Acfas
Annales de l'Acfas. — Association Canadienne-Française pour l'Avancement des Sciences, Université de Montréal, 2900 Boulevard du Mont Royal, Montreal 3.

Ann. Assoc. Internat. Calcul Analogique
Annales de l'Association internationale pour le Calcul Analogique. — Publisher: Presses Academiques Europeennes, 98 Chaussee de Charleroi, Brussels 6.

Ann. Astrophys.
Annales d'Astrophysique. — Service des Publications du C.N.R.S., 15 Quai Anatole-France, Paris 7.

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Ann. Phys. (New York)
Annals of Physics. — Academic Press, 111 Fifth Avenue, New York 3, N.Y.

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Annales de Radioélectricité. — Compagnie Générale de T.S.F., Centre Documentation de la CSF, 101 Boulevard Murat, Paris 16.

Ann. sci. Ecole Normale Super.
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Annales de la Société Scientifique de Bruxelles. — 11 Rue des Récollets, Louvain.

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Annales des Télécommunications. — Centre National d'Études des Télécommunications. Subscription address: Société de la Revue d'Optique, 3 et 5, Boulevard Pasteur, Paris 15.

Ann. Univ. Turku
Annales Universitatis Turkuensis. Ser. A I (Astronomica-Chemica-Physica-Mathematica). — Turun Yliopiston Turku, Finland.

Annu. Fac. Phil. Skopje, Sect. Sci. nat.
Annuaire de la Faculté de Philosophie de l'Université de Skopje, Section des sciences naturelles. (Godišen Zbornik) — Institut de Physique de la Faculté de Sciences, Postanski fah 146, Skopje (Macedonia), Yugoslavia.

Annu. Proc. Assoc. Socs S. Africa
Annual Proceedings of the Associated Scientific and Technical Societies of South Africa. — Kelvin House, Marshall and Holland Streets, P.O. Box 5907, Johannesburg.

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Appl. Math. Ser. Nat. Bur. Stand.
Applied Mathematics Series, National Bureau of Standards. — U.S. Government Printing Office, Washington 25, D.C.

Appl. sci. Res.
Applied Scientific Research. Section A (Mechanics, Heat, Chemical Engineering, Mathematical Methods); Section B (Electrophysics, Acoustics, Optics, Mathematical Methods). — Martinus Nijhoff, The Hague.

Appl. Spectrosc.
Applied Spectroscopy. — Society for Applied Spectroscopy. Publication address: P.O. Box 1228, 417 Cleveland Avenue, Plainfield, New Jersey.

Applic. and Industr.
Applications and Industry. — Part II of the Transactions of the American Institute of Electrical Engineers [Trans Amer. Inst. Elect. Engrs].

Arch. Automat. Telemekh.
Archiwum Automatyki i Telemekhaniki. — Polska Akademia Nauk, Zaklad Automatyki. Subscription address: PKWZ "Ruch", ul. Wilcza 46, Warsaw.

Arch. elekt. Übertragung
Archiv der elektrischen Übertragung. — S. Hirzel Verlag, Stuttgart.

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Bulletin of the British Scientific Instrument Research Association. — Title changed to: Instrument Abstracts.

SUBJECT INDEX

INTRODUCTION.

The entries in this index refer to the abstracts by their serial number, not by the page number. The entries are grouped under headings (underlined, e.g. "Aerials") which represent, in the main, general categories or concepts rather than specific names. No attempt has been made to provide an individual heading for every subject, machine, apparatus or component appearing in the literature of Electrical Engineering. If a heading for a particular subject does not appear, a more general heading should be consulted; for example, "Leclanché cells" would be listed under "Batteries, primary". There are numerous cross-references directing attention to related headings in other parts of the index.

Many of the headings are subdivided by the use of subheadings, which are indented (i.e. printed slightly to the right) and commence with a small letter (for example, see the subheadings under "Characteristics measurement").

ARRANGEMENT OF HEADINGS AND SUBHEADINGS.

The headings are arranged throughout the index in alphabetical order according to British Standard 1749:1951 (the "word by word" system, not "reading right through"). The subheadings are themselves arranged in alphabetical order under their respective headings.

INDENTED GROUPS OF ENTRIES.

In addition to the above, minor groupings of entries have been made by indentation under an introductory entry. The first phrase of the introductory entry (i.e. the phrase preceding the comma) is common to each of the indented entries. It is emphasized, however, that these groupings do not necessarily collect all the information on their particular subject; they are only convenient groupings of words, and further references may be given elsewhere in the same column under a different phrase.

COLLECTED LIST OF SUBJECT HEADINGS.

The alphabetical arrangement of the headings is the most convenient for locating a known heading quickly, but there may be other related headings elsewhere in the index of which the reader is unaware, and which he would only come across by accident. To assist the reader to discover all the headings appropriate to his subject, a collected list of the headings is given at the end of the index, which should be consulted as a matter of routine each time a search is made. In this list, the headings are not arranged in alphabetical order, but are grouped into sections by subject on the same basis as the arrangement of the abstracts in the monthly issues of Electrical Engineering Abstracts. By using this list, the reader can quickly determine which are the headings appropriate to his subject, and they are then easily found in the main index in their alphabetical position.

HEADINGS WITH NO ENTRIES.

Because Electrical Engineering is a developing subject, it is not possible to maintain the list of headings unchanged from year to year; it is subject to a continuous process of revision, with the introduction of new headings and subheadings, and the alteration and elimination of old ones. This process is a gradual one, however, and the great majority of the headings are the same as those of the previous year. To assist in maintaining the continuity of the index, all the headings in current use are printed each year, even those for which there are no abstracts to be recorded in the present volume. The latter are followed by the announcement "No entries this year"; this supplies confirmation that these headings have not been dropped from the index, and entries may reappear under them next year.

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